

Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Claim 19 is amended.

Listing of Claims:

1. (Original) A voltage controlled oscillator with a modulation function, comprising:
 - a first varactor diode;
 - a second varactor diode whose anode side is connected to an anode side of the first varactor diode and a ground voltage;
 - a third varactor diode whose cathode side is connected to a cathode side of the first varactor diode;
 - a fourth varactor diode whose anode side is connected to an anode side of the third varactor diode and whose cathode side is connected to a cathode side of the second varactor diode;
 - a first resistor connected between a connection point between the anode sides of the third varactor diode and the fourth varactor diode and a connection point between the anode sides of the first varactor diode and the second varactor diode;
 - a modulation current terminal for performing frequency modulation that is connected to the anode sides of the third varactor diode and the fourth varactor diode;
 - a second resistor connected between a connection point between the cathode sides of the first varactor diode and the third varactor diode and a voltage input terminal;
 - a third resistor connected between a connection point between the cathode sides of the second varactor diode and the fourth varactor diode and the voltage input terminal;
 - a first capacitor having a first end connected to a connection point between the cathode sides of the first varactor diode and the third varactor diode;
 - a first inductor having a first end connected to a second end of the first capacitor;
 - a second capacitor having a first end connected to a connection point between the cathode sides of the second varactor diode and the fourth varactor diode;

a second inductor having a first end connected to a second end of the second capacitor; and

a voltage source connected to second ends of the first inductor and the second inductor,

wherein a wave that is frequency-modulated is output by controlling a current.

2. (Original) The voltage controlled oscillator with a modulation function according to claim 1, wherein an oscillation frequency is shifted by changing a capacitance value of a capacitor including the first capacitor that configures a first LC resonant part in cooperation with the first inductor, and a capacitance value of a capacitor including the second capacitor that configures a second LC resonant part in cooperation with the second inductor, thereby obtaining a plurality of frequency bands.

3. (Original) The voltage controlled oscillator with a modulation function according to claim 1, comprising a current control circuit that is provided at the modulation current terminal, and controls a modulation current based on modulation data and frequency data.

4. (Original) The voltage controlled oscillator with a modulation function according to claim 2, comprising a current control circuit that is provided at the modulation current terminal, and controls a modulation current based on modulation data and band data.

5. (Original) The voltage controlled oscillator with a modulation function according to claim 2, comprising a current control circuit that is provided at the modulation current terminal, and controls a modulation current based on modulation data, frequency data, and band data.

6. (Original) The voltage controlled oscillator with a modulation function according to claim 1, comprising:

an arithmetic circuit for receiving modulation data and frequency data, and compensating a modulation current by an arithmetic operation; and

a digital-analog converter for receiving a digital modulation current compensated by the arithmetic circuit, and converting the digital modulation current into an analog modulation current to the modulation current terminal.

7. (Original) The voltage controlled oscillator with a modulation function according to claim 6, comprising a filter that is provided between the modulation current terminal and the digital-analog converter, and eliminates a digital noise of the digital-analog converter.

8. (Original) The voltage controlled oscillator with a modulation function according to claim 2, comprising:

an arithmetic circuit for receiving modulation data and band data, and compensating a modulation current by an arithmetic operation; and

a digital-analog converter for receiving a digital modulation current compensated by the arithmetic circuit, and converting the digital modulation current into an analog modulation current to the modulation current terminal.

9. (Original) The voltage controlled oscillator with a modulation function according to claim 8, comprising a filter that is provided between the modulation current terminal and the digital-analog converter, and eliminates a digital noise of the digital-analog converter.

10. (Original) The voltage controlled oscillator with a modulation function according to claim 2, comprising:

an arithmetic circuit for receiving modulation data, frequency data, and band data, and compensating a modulation current by an arithmetic operation; and

a digital-analog converter for receiving a digital modulation current compensated by the arithmetic circuit, and converting the digital modulation current into an analog modulation current to the modulation current terminal.

11. (Original) The voltage controlled oscillator with a modulation function according to claim 10, comprising a filter that is provided between the modulation current terminal and the digital-analog converter, and eliminates a digital noise of the digital-analog converter.

12. (Original) The voltage controlled oscillator with a modulation function according to claim 1, comprising:

an arithmetic circuit for receiving modulation data and frequency data, and compensating a modulation current by an arithmetic operation;

a ROM for receiving as an address signal a digital modulation current compensated by the arithmetic circuit, and outputting a data signal stored in the ROM;

a digital-analog converter for receiving the data signal from the ROM, and converting the data signal into an analog modulation current to the modulation current terminal; and

a filter that is provided between the modulation current terminal and the digital-analog converter, and eliminates a digital noise of the digital-analog converter.

13. (Original) The voltage controlled oscillator with a modulation function according to claim 2, comprising:

an arithmetic circuit for receiving modulation data and band data, and compensating a modulation current by an arithmetic operation;

a ROM for receiving as an address signal a digital modulation current compensated by the arithmetic circuit, and outputting a data signal stored in the ROM;

a digital-analog converter for receiving the data signal from the ROM, and converting the data signal into an analog modulation current to the modulation current terminal; and

a filter that is provided between the modulation current terminal and the digital-analog converter, and eliminates a digital noise of the digital-analog converter.

14. (Original) The voltage controlled oscillator with a modulation function according to claim 2, comprising:

an arithmetic circuit for receiving modulation data, frequency data, and band data, and compensating a modulation current by an arithmetic operation;

a ROM for receiving as an address signal a digital modulation current compensated by the arithmetic circuit, and outputting a data signal stored in the ROM;

a digital-analog converter for receiving the data signal from the ROM, and converting the data signal into an analog modulation current to the modulation current terminal; and

a filter that is provided between the modulation current terminal and the digital-analog converter, and eliminates a digital noise of the digital-analog converter.

15. (Original) The voltage controlled oscillator with a modulation function according to claim 12, wherein the digital-analog converter compensates an output amplitude level based on amplitude compensation data so as to adjust a central value of a modulation factor.

16. (Original) The voltage controlled oscillator with a modulation function according to claim 13, wherein the digital-analog converter compensates an output amplitude level based on amplitude compensation data so as to adjust a central value of a modulation factor.

17. (Original) The voltage controlled oscillator with a modulation function according to claim 14, wherein the digital-analog converter compensates an output amplitude level based on amplitude compensation data so as to adjust a central value of a modulation factor.

18. (Original) A voltage controlled oscillator with a modulation function, comprising:

a first varactor diode;

a second varactor diode whose cathode side is connected to a cathode side of the first varactor diode and a ground voltage;

a third varactor diode whose anode side is connected to an anode side of the first varactor diode;

a fourth varactor diode whose cathode side is connected to a cathode side of the third varactor diode and whose anode side is connected to an anode side of the second varactor diode;

a first resistor connected between a connection point between the cathode sides of the third varactor diode and the fourth varactor diode and a connection point between the cathode sides of the first varactor diode and the second varactor diode;

a modulation current terminal for performing frequency modulation that is connected to the cathode sides of the third varactor diode and the fourth varactor diode;

a second resistor connected between a connection point between the anode sides of the first varactor diode and the third varactor diode and a voltage input terminal;

a third resistor connected between a connection point between the anode sides of the second varactor diode and the fourth varactor diode and the voltage input terminal;

a first capacitor having a first end connected to a connection point between the anode sides of the first varactor diode and the third varactor diode;

a first inductor having a first end connected to a second end of the first capacitor;

a second capacitor having a first end connected to a connection point between the anode sides of the second varactor diode and the fourth varactor diode;

a second inductor having a first end connected to a second end of the second capacitor; and

a voltage source connected to second ends of the first inductor and the second inductor,

wherein a wave that is frequency-modulated is output by controlling a current.

19. (Currently Amended) The voltage controlled oscillator with a modulation function according to ~~any one of claims 3, 5 to 7, 10 to 12, 14, 15, and 17~~ claim 3, wherein an input voltage from the voltage input terminal is used instead of the frequency data.